Environment Canada
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GREAT LAKES FACT SHEET

Amphibians and Reptiles in Great Lakes Wetlands: THREATS AND CONSERVATION

This fact sheet describes the importance of wetlands to people, to the ecology of the biosphere as a whole, and especially to the amphibians and reptiles that depend upon wetlands for their survival. It examines some of the various threats to our remaining Great Lakes wetlands and some of the ongoing efforts to protect existing wetlands and restore degraded ones.

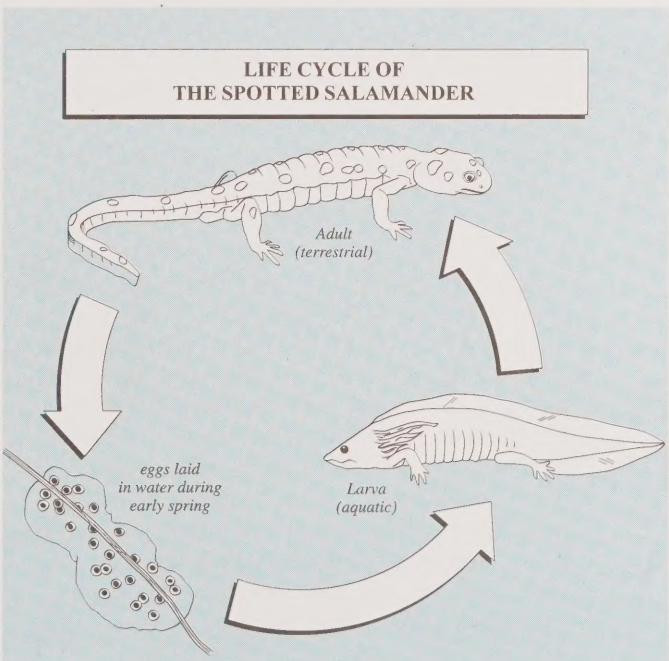
The warm rains of early spring have ended and the spotted salamander, after spending five months underground, returns to breed in the pond in which she was hatched. Crossing the road from the woods where she makes her home, she passes the remains of many of her kind -- when everyone moves to the breeding pond at once it can make populations vulnerable to quick destruction. The male salamanders have arrived a few days earlier and are waiting in groups of hundreds on the edges of the wetland. Lacking the ability to call like male frogs and toads, the salamanders must rely on their sense of smell to locate a mate.

A few days after mating, the female salamander is ready to lay her eggs. She searches for a twig that is firmly attached to the pond floor and, climbing the twig, slowly extrudes several eggs at a time covered in jelly to protect them and keep them afloat. When she is finished, the round egg mass is about the size of a tennis ball and contains two hundred eggs.

The salamander's eggs have a good start. They were laid on the fifth of April, so they have plenty of time to develop and hatch over the next six weeks. Hopefully the eggs will survive to hatch and there will still be plenty of food like mosquito larvae, fairy shrimp, zooplankton, and even a few toad tadpoles for the larvae. If this wetland has been spared pollution by acid rain, pesticides, run-off from roads and fields, and sewage treatment plants then another generation of salamanders may thrive here -- as long as no one fills in this wetland for houses or industrial development. In addition to artificial threats, the eggs may be eaten by newts, turtles, fish or caddisfly larvae, or a late cold snap might freeze the wetland to the bottom killing the eggs.

J. Giles

Spotted Salamander



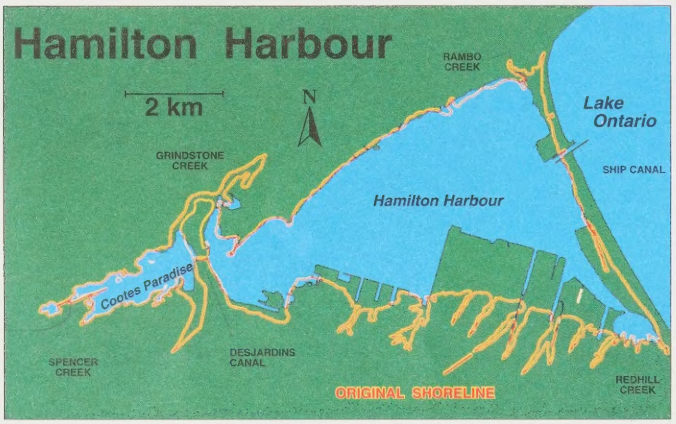
L. Shirose

Once hatched, the larvae use their feathery gills to breathe underwater for another two months. By July or August, the larvae will trade their gills for lungs and leave the wetland for nearby forest where they may live for up to ten years, and grow as large as 25 cm -- about the same length as a person's foot. The spotted salamander is secretive throughout much of the year, living in leaf litter, under stones and logs, or in burrows of other animals. By feeding on the forest floor at night, they find their invertebrate dinners and avoid predators.

WETLANDS: A VANISHING RESOURCE

What is a wetland?

Wetlands are the interface between land and water bodies. There are many different types of wetlands, but all have certain features in common. They occur where the water table is at or near the surface, the ground is saturated with water or covered by shallow water at some time during the growing season each year, and the vegetation consists mostly of plants adapted for saturated soil conditions. Wetlands are often classified by the type of vegetation that predominates. Different types of wetland habitat include bogs, fens, marshes and swamps.



V. Cairns

Impact of development on the wetlands surrounding Hamilton Harbour.

THE VALUE OF WETLANDS

Habitat for wildlife

Wetlands are extremely productive ecosystems which provide crucial habitat, and feeding and breeding grounds for many species of reptiles and amphibians, waterfowl, mammals and invertebrates. They are also critical stopovers for migrating birds. Wetlands support an enormous diversity of plants and animals, including a large number of threatened and endangered species.

Water purification

Wetlands are valuable because they improve water quality and renew water supplies. They provide a natural water purification system by absorbing and filtering contaminants and excessive nutrients, which could otherwise degrade groundwater or the quality of rivers and lakes. Wetland vegetation absorbs phosphorous and nitrate by incorporating them into plant tissue and then incorporating the plant tissue into the buildup of organic soils.

Flood control

Wetlands act as reservoirs which help to control and reduce flooding by storing water and releasing it slowly. Wetland vegetation also helps to protect shorelines from erosion by binding stream banks and by absorbing wave energy. When vegetation is removed, stream banks may collapse leaving wide channels of murky, sediment-filled water.

Recreational activities

Wetlands are also places of great beauty. They provide opportunities for hiking, birdwatching, canoeing, hunting, trapping and fishing.

Food Webs

Because of their high productivity and biodiversity, wetlands are very complex ecosystems supporting many different species. The bullfrog tadpole is a vegetarian that feeds on many varieties of plants. The adult bullfrog is a carnivore that will eat anything it can catch, including insects, fish, other frogs, mice and small birds, bats, and snakes. The bullfrog itself is preyed upon by many other animals. Bullfrog tadpoles are eaten by many insects and fish, while adults are eaten by fish, turtles, snakes, herons, minks, raccoons, and many other species including humans. The plants and animals that are consumed by bullfrogs are also eaten by other species, and the animals that eat bullfrogs eat many other things as well. This complex tangle of predators and prey is called a "food web". Food webs are so complex that they are unpredictable. When one species disappears, the whole web could collapse in a domino-like effect, and it is very difficult to reconstruct an ecosystem after such a disaster.

THREATS TO WETLANDS

The Great Lakes drainage basin contains 95 per cent of the surface water in North America, 21 per cent of the world's surface freshwater, and boasts a wide variety of freshwater wetland communities.

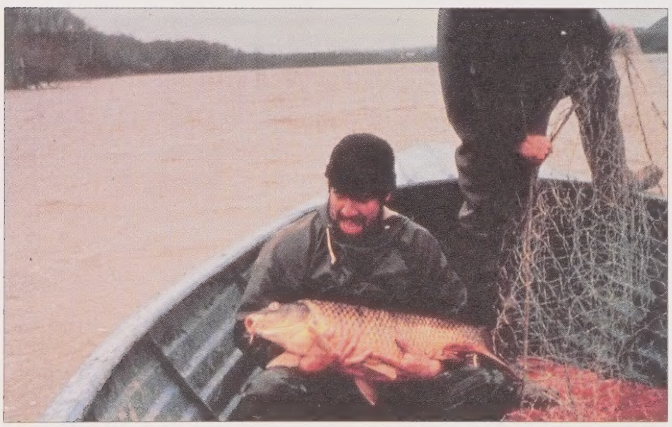
Prior to European settlement, there were wetlands stretching from the western edge of Lake Erie across Ohio into Indiana, and covering the southern edge of Ontario. Two-thirds of Great Lakes coastal wetlands have been lost, many drained or reclaimed for land development purposes including prime farmland, new harbour facilities and urban expansion. An example of this is the extensive loss of wetland in Hamilton Harbour.

Wetlands have been destroyed or degraded by filling and drainage for land development, and by dredging for commercial and recreational water traffic. The removal of tree cover and shoreline vegetation is a major threat to wetland integrity. Regular mechanical clearance of vegetation in wetland corridors such as ditches can render them impassable to many species and contribute to the isolation of populations, increasing the danger of extirpation. Also, the stabilization of water levels in all of the Great Lakes has resulted in decreased productivity and modification of the wetland aquatic plant community structure and diversity. When water levels are not allowed to fluctuate, wetlands may

become dominated by a single tolerant species of plant, such as the cattail. The loss of plant diversity produces a chain reaction that decreases animal diversity by reducing the variety of food and habitat available.

Wetlands may be polluted by industrial and commercial operations, agricultural run-off, stormwater and other sources. Pollutants can include sediment, excess nutrients, trace metals, organic pollutants and grease, oil and salt from roads. Wetlands on the Great Lakes are also exposed to invasion by exotic species such as zebra mussels, purple loosestrife, common reed, and common carp.

Shoreline wetlands are susceptible to pollution and exploitation by introduced species because they are located in the shallow areas at the end of the creeks and rivers that flow into the Great Lakes and St. Lawrence River. Water soluble pollutants are a problem because they attach to soils that run into the water. Alien seeds or animals from the watershed above a wetland can also be carried swiftly down to the wetland. Invasion is also possible in the reverse direction, with species travelling upstream from lakes where they were introduced, either by accident or design. In the Great Lakes basin, the common carp and purple loosestrife are two introduced species which have had a serious impact on wetlands.



V. Cairns

Common Carp

Common Carp

The common carp (*Cyprinus carpio*) is a freshwater fish believed to have originated in eastern Asia. Carp were first imported to North America from Europe in the 1800s as a potential food fish. The carp in Lake Ontario are likely descended from fish introduced into the waters of New York State and the American portion of Lake Ontario in the late 1800s, and from the accidental escape of fish with the breaking of dams on tributary streams. This species has also entered the Great Lakes basin through the Trent Canal system from Lake Simcoe.

Carp are omnivorous, eating both animals and plants. When feeding, they suck up mud from the bottom and then expel it and select their food while it is suspended in the water. In addition to directly uprooting vegetation, carp feeding and spawning behaviour interferes with plant photosynthesis by muddying the water so that sunlight cannot penetrate.

J. Corrigan

Wetland invaded by Purple Loosestrife.

Purple Loosestrife

Purple loosestrife (*Lythrum salicaria*) is a tall, emergent, aquatic plant from Eurasia, which first became established in eastern North America in the early 19th century. By the late 1800s, it had spread throughout the northeastern United States and southeastern Canada to Manitoba. By 1940 purple loosestrife was reported in the northwestern United States and southwestern Canada.

The primary method of introduction of purple loosestrife was likely accidental, via shipping. The use of purple loosestrife as a honey plant and as an ornamental has also contributed to its rapid spread. Purple loosestrife caused few problems until the 1930s, when it began to grow aggressively in the floodplain pastures of the St. Lawrence River. Since then its distribution has steadily expanded and now poses a threat to native emergent vegetation in shallow water marshes throughout the eastern and central regions of Canada.

The impact of purple loosestrife on native vegetation has been severe in some areas, where it causes the wetland to dry out and no longer support many species that previously thrived. Purple loosestrife is very good at invading disturbed areas, such as construction sites for docks and marinas. It may also invade and force out native plants in some undisturbed habitats to form dense, single-species stands. There are indications of serious reductions in waterfowl and aquatic mammal productivity because purple loosestrife does not provide suitable habitat for food, nesting or shelter.

Removal of plants by hand is effective in eliminating purple loosestrife in small, isolated stands. It is important to pull the plants before seed heads form and to pull the entire plant, including the rootstock, as well as remove all plant material from the site to prevent re-establishment of fragments. This plant can also be controlled by manipulation of water levels. In addition, biological control is currently being tested by the University of Guelph, in Ontario. Two species of beetles and one species of weevil that feed on various parts of the plant are being studied. Since 1993, approximately 70,000 beetles have been released at 131 sites across Ontario. Preliminary results indicate that the beetles have established viable populations and are effective at controlling the purple loosestrife.

AMPHIBIANS AND REPTILES IN THE GREAT LAKES BASIN

At present, there are 40 species of amphibians and 50 species of reptiles in Canada. The timber rattlesnake can no longer be found in the wild in Canada. Two species of snake, the blue racer and the Lake Erie water snake, and one species of frog, Blanchard's cricket frog, are designated as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This means that they are in imminent danger of disappearing from the wild, and possibly face extinction. Three other species, the Eastern Massasauga rattlesnake, the spiny softshell turtle and the Blanding's turtle, are listed as threatened species, indicating that they are likely to become endangered in Canada if the factors affecting their vulnerability do not become reversed.

J. Mitchell

Eastern Massasauga Rattlesnake

What Are Amphibians and Reptiles?

Frogs, toads, newts and salamanders are amphibians. The word "amphibian" is derived from the Greek word *amphibia*, meaning "two lives". The ancient Greeks recognized that these animals lived both in the water and on the land, just like the spotted salamander, which lives in the forest for most of the year, but returns to the pond to breed. Snakes, turtles and lizards are reptiles. The word "reptile" is derived from the Latin word *reptum*, meaning "to creep".

The scaly skin of the reptile, compared with the moist skin of the amphibian, is the most basic and obvious difference between these two classes of animals. Reptiles have existed on Earth for 340 million years and amphibians have existed for even longer, 368 million years. However, there is concern that more and more of the populations of these animals are disappearing completely, or that their numbers are dwindling, because of human impact on their environment, particularly on wetlands.

C. Bishop

A typical Ontario wetland.

HABITAT LOSS

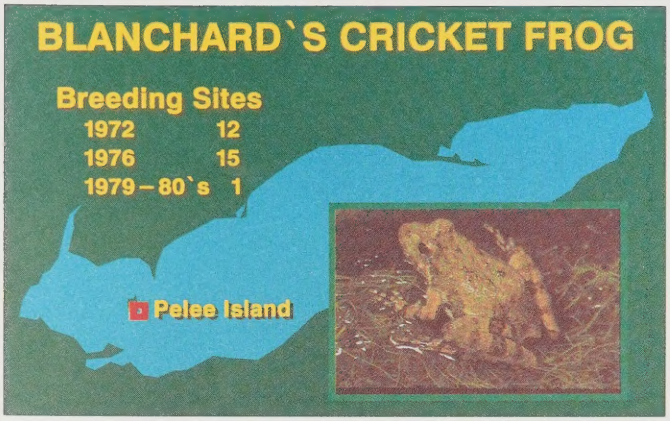
There are many reasons for the decline in amphibian and reptile populations. The destruction of habitat deprives animals of food and shelter, as well as vital sites for nesting and hibernation. Some pollutants can increase the incidence of birth defects. Introduced species may force out or prey upon native species. Frogs are collected by humans for food, bait and scientific research. Many amphibians are killed crossing roads as they return to water to breed, and snakes and turtles are killed on sun-warmed roads where they bask on cool evenings. Also, since turtles need undisturbed, sandy areas close to water in which to lay their eggs, development of shoreline and riverbank areas may destroy nesting sites and force these reptiles to travel further to find suitable sites, perhaps exposing them to the hazards of crossing roads. Nest predation by raccoons, which are becoming more numerous throughout much of the province, especially near to human settlements and roads, may also be a factor in declines.

Fortunately, many of these factors can be reversed. For example, tunnels under roads can provide safe passage for amphibians and reptiles on the move, and artificial sand and log mounds and brush piles can be constructed to provide areas where snakes and turtles can hibernate, bask and lay their eggs. But the best way to save reptiles and amphibians is to preserve their natural habitat, especially the wetlands.

Habitat conservation and rehabilitation is the purpose of initiatives like the Great Lakes Wetlands Conservation Action Plan (GLWCAP) under the new Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA). The goal of the GLWCAP is to rehabilitate and protect 6,000 ha of wetland habitat by the year 2000.

Blanchard's Cricket Frog

Although the Northern cricket frog is locally common in eastern North America, only the subspecies known as Blanchard's cricket frog *(Acris crepitans blanchardi)* is found in Canada. This subspecies has been found only at Point Pelee National Park and Pelee Island in Lake Erie. Because Blanchard's cricket frogs have not been reported



National Audubon Society

J. Mitchell

Eastern Spiny Softshell Turtle

at Point Pelee since 1920, and have been reported from only one location on Pelee Island since 1977, they were designated as endangered in 1990.

Blanchard's cricket frog is a small, non-climbing member of the tree frog family. Adult cricket frogs are usually brown or grey with a dark, V-shaped marking on the head between the eyes. These frogs have long hind legs and a generally warty appearance, and may grow as large as the end of your thumb. Cricket frogs remain in the vicinity of permanent water throughout the year and prefer to inhabit gently sloping muddy or sandy shores of ponds, ditches or marshes. During the breeding season, from early June to late July, male cricket frogs produce a song which sounds like the clicking of pebbles in rapid succession.

Reasons for the decline in this species are not well understood, but likely include factors such as habitat loss, agricultural use of pesticides, and fluctuating water levels in Lake Erie, which may have flooded the shoreline wetlands where the frogs lived exposing them to predatory fish. The decline of the cricket frog is even more difficult to understand since several other species of frogs continue to thrive at the same site. The Blanchard's Cricket Frog Recovery Team is currently considering means of restoring the Canadian population by protecting existing habitat and perhaps introducing frogs from nearby islands in the United States.

Eastern Spiny Softshell Turtle

The Eastern spiny softshell (*Trionyx spiniferus*) is one of the rarest turtles in Canada. Its population appears to have declined significantly since the 1800s. In 1989, the softshell turtle was added to Canada's Endangered Species list in the threatened category. Habitat deterioration and loss are likely the major factors in this turtle's decline. Other possible reasons for the decline are environmental contaminants, nest predation, flooding of nest sites, and the accidental capture by commercial and sport fishing.

The Eastern spiny softshell looks very odd. It has a flattened, leathery shell -- it is sometimes called the "pancake" turtle -- which is olive to tan in colour with a variable pattern of black rings on juveniles and adult males, and dark blotches on adult females. The neck and head are long and narrow, tapering to a snorkel-like snout. The shell of the male is 23 cm long, and is covered with tiny spines. The female is almost twice as large as the male and her shell is smooth except for tiny spines along the anterior edge.

The softshell turtle is found along the shoreline of large lakes and rivers. When basking, they prefer to climb out onto sandy beaches, gravel bars, mud flats, or gently sloped river banks. In June and July, females lay about 18 pinkish eggs, which they bury in a sunny spot -- usually a sandy beach or gravel bar.

In Canada, the Eastern spiny softshell turtle is found only in southern Ontario and southeastern Quebec. Most Quebec sightings come from the north end of Lake Champlain and the Richilieu River. In Ontario, this turtle's range is discontinuous with isolated populations occurring in the Ottawa River, western Lake Ontario, Lake Erie, Lake St. Clair, and the Thames, Sydenham and Ausable watersheds.

CONTAMINANTS

Animals that live in the wetlands of the Great Lakes - St. Lawrence River basin can be exposed to contamination through the food they eat, the water they live in and the air they breathe. Pollutants in species that are long-lived and relatively sedentary, such as the common snapping turtle and mudpuppy, are ideal for monitoring local pollution sources in the basin.

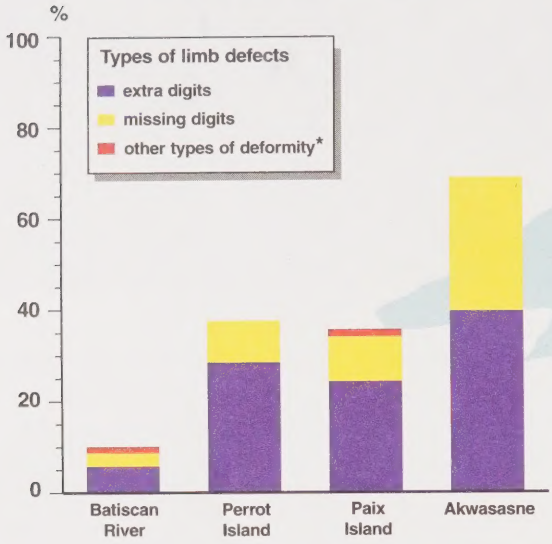
The Snapping Turtle

The common snapping turtle (*Serpentina serpentina*) is the largest freshwater turtle occurring in Canada. Females in the Great Lakes average five to six kg, and males are often twice that size. Snapping turtles are a common inhabitant of wetlands in southeastern Canada and they eat a variety of foods including insects, other amphibians and reptiles, crayfish, birds and their eggs, and especially fish and plants. Due to a diet high in animal matter, snapping turtles may be exposed to higher concentrations of contamination than most other turtle species, which are mainly vegetarian.

In June, snapping turtles in the Great Lakes lay 30-50 eggs in a dry and sunny location on the shoreline of a

LEVELS AND EFFECTS OF CONTAMINANTS IN SNAPPING TURTLE AND MUDPUPPY EGGS

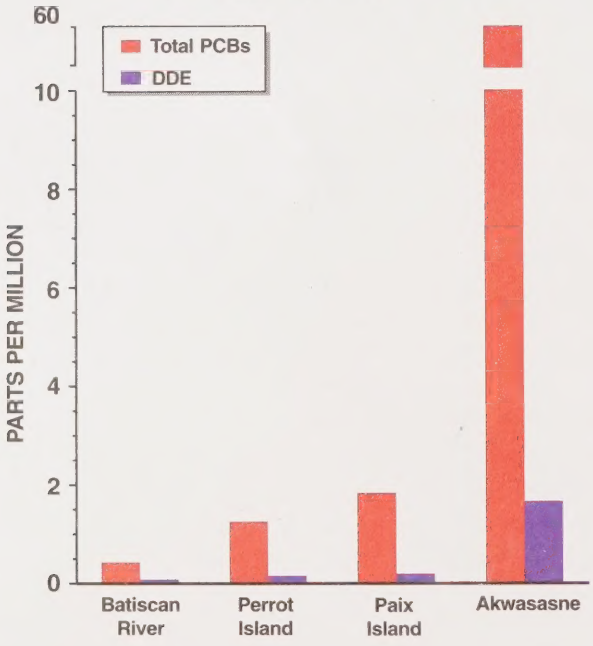
Percentage of Mudpuppies with Limb Deformities



St. Lawrence River populations

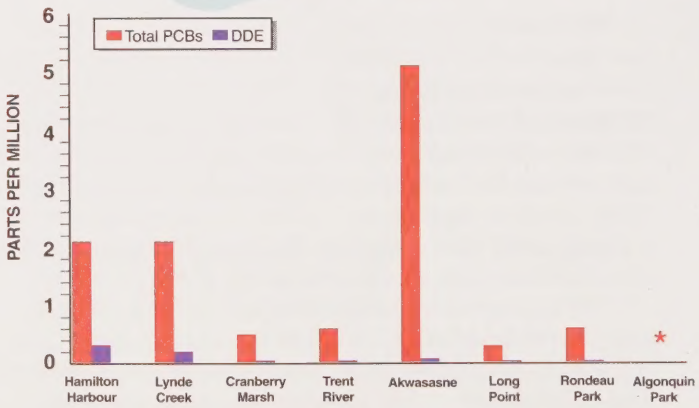
* other types = dwarfism of the limb, curved digits, abnormal shaped femur or humerus, complete limb missing

PCBs and DDE in Mudpuppy Eggs (1994)



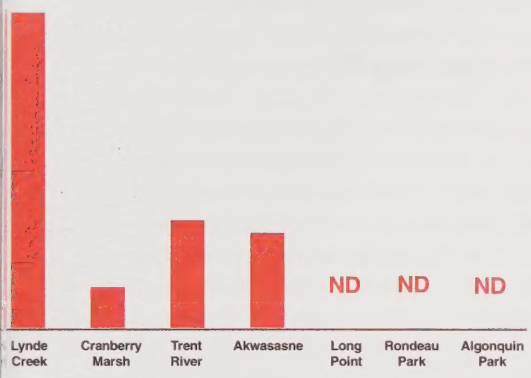
St. Lawrence River populations

PCB and DDE Concentrations in Snapping Turtle Eggs (1989/1990)



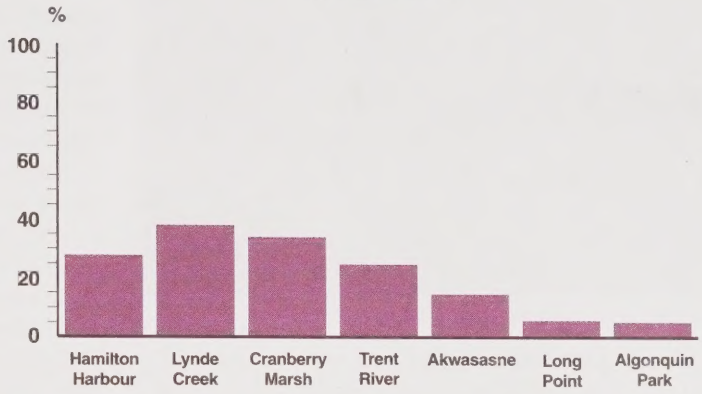
* concentrations for all compounds below 0.02 part per million

trachlorodibenzo-p-dioxin Concentrations in Snapping Turtle Eggs (1989/1990)

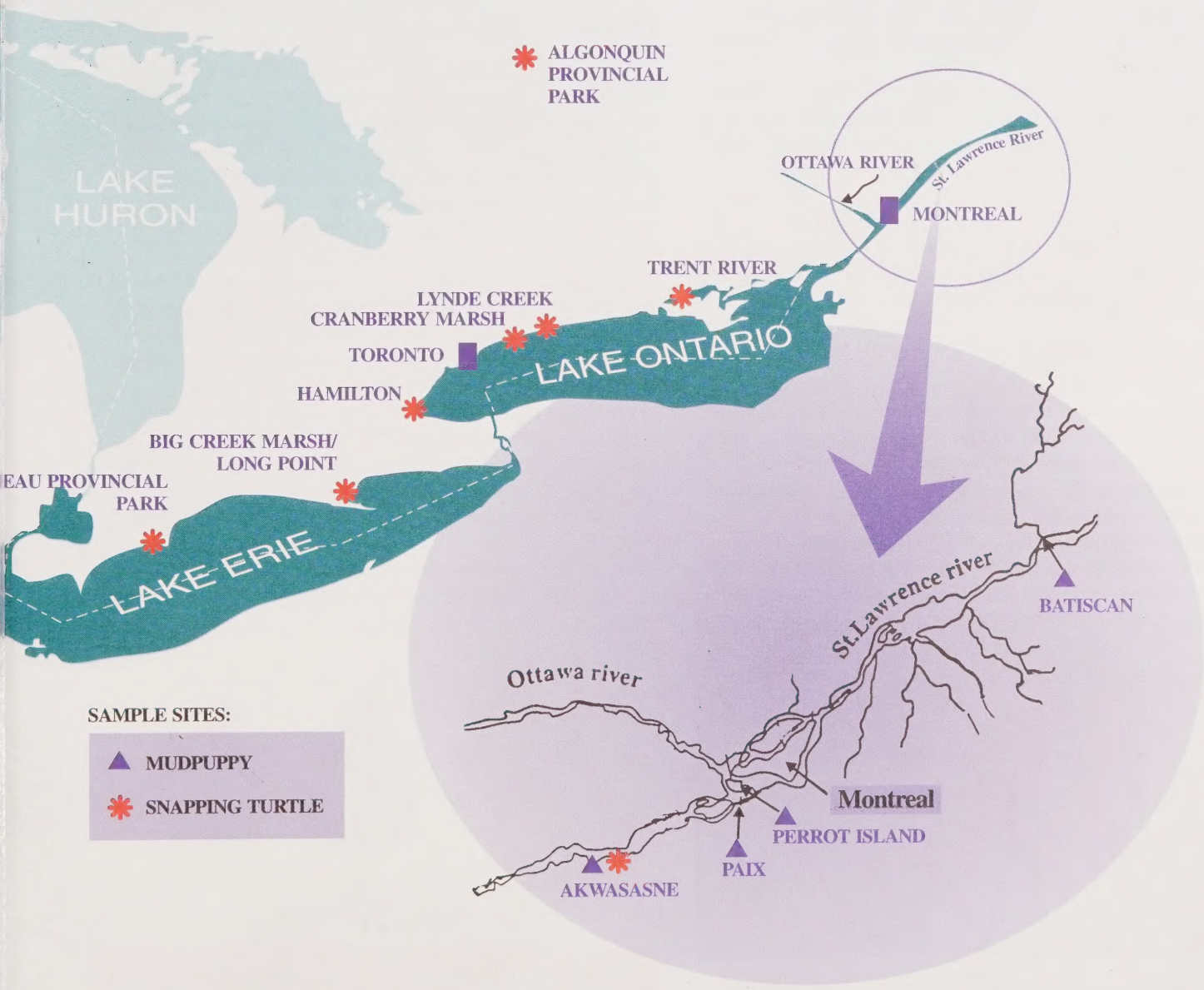


› 2378-tetrachlorodibenzo-p-dioxin detected

Percentage of Abnormal Development of Snapping Turtle Eggs (1986-1991)



% values represent sum of the rates of unhatched eggs plus deformed hatchling turtles



C. Bishop

Common snapping turtle laying eggs.

wetland. The female turtle will often travel great distances, sometimes up steep slopes, to find a suitable south-facing location to dig a nest and lay spherical, white eggs. Predators, such as skunks, foxes and raccoons, will sniff out over 90 per cent of the nests and eat the eggs before they hatch. Hatchling turtles from surviving nests are often eaten by herons and crows before they reach the relative safety of the water.

Due to the high predation rate on the nests and young, snapping turtles have evolved to live 50 or more years and to start reproducing at as young as seven years of age so that they can increase the chances that at least two hatchlings will survive to replace their parents. Although adult snapping turtles have few natural predators, populations are extremely vulnerable to the excessive commercial hunting of adults, and to the death of females hit by cars when crossing roads to find nesting sites.

The Mudpuppy

The mudpuppy (*Necturus maculosus*) is a large salamander, about 30 cm long, that lives its entire life in water. It is widespread in lakes and rivers of North America. Adult mudpuppies are mottled brown with long, feathery, maroon-coloured gills. These amphibians also possess lungs which aid in respiration when oxygen levels are low. Mudpuppies retain their gills for their entire lives, never transforming into air-breathing, gill-less adults as do most salamanders. Like all salamanders, they hide under rocks and logs during the daytime, and search for food at night. Their prey includes insects, snails, fish, other amphibians and especially crayfish. Mudpuppies live more than 25 years if they can avoid being eaten by turtles, water snakes, large fish such as bass, pike and pickerel, or occasionally, by mink or raccoon. Unlike most amphibians, mudpuppies are active during the cold months. Adults are frequently caught by people who are ice fishing, particularly in the late winter.

Courtship and mating occur in the fall, but eggs are not laid until the following spring. Before the female mudpuppy lays her eggs, she creates a hollowed-out depression under a log or flat rock. She attaches 18 to 180 eggs on the underside of the log by remaining upside down for several hours while the eggs are slowly extruded from her body. She will guard the eggs for four to eight weeks until they hatch. Larvae are about as long as a thumb nail, and will not mature until they are about five years old and 20 cm long.

G. Barrett

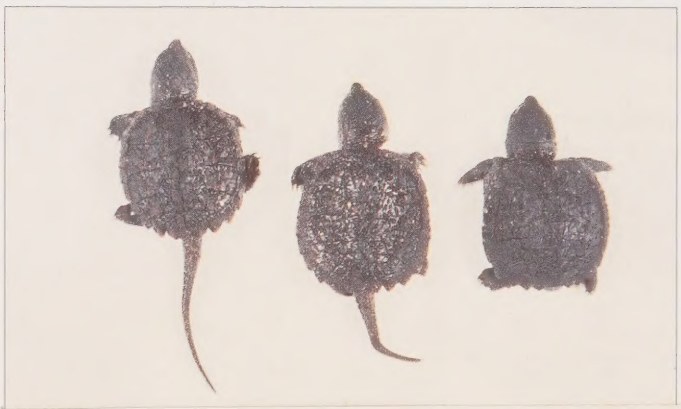
Mudpuppy

Effects of Contaminants

Snapping turtle eggs and mudpuppies from the Great Lakes and St. Lawrence River can contain high concentrations of fat-soluble contaminants which are absorbed as food is digested. These include polychlorinated biphenyls (PCBs), dioxins and furans, and organochlorine pesticides (see map). Abnormal development, such as unhatched eggs or deformed animals, occurs at the highest rates in the sites which are most contaminated (see map).

In turtle eggs incubated in the laboratory, the number of deformities and eggs that did not hatch increased as concentrations of PCBs and dioxins and furans rose (see map). For example, the average rate of deformities at the Algonquin Provincial Park site was only 6 per cent, whereas the rate of abnormality was at least twice this rate in all of the Lake Ontario and St. Lawrence River sites. Eggs from Lake Erie had rates of abnormality similar to, or lower than, this rate in all years. Abnormal development of tails, legs, shells, eyes and yolk sacs have been found (see map).

In mudpuppies from the St. Lawrence and Ottawa Rivers, extra or fewer than normal toes, and toes that were

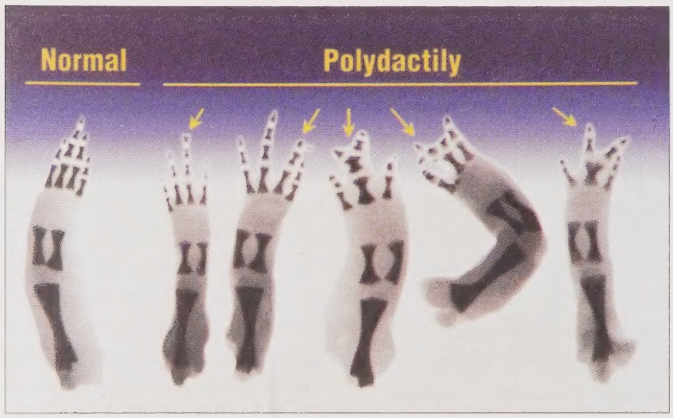


C. Bishop

Hatchling snapping turtles showing tail deformities (right and centre) and normal tail (left).

fused together were found at higher rates (about 60 per cent) in the most contaminated sites than in clean sites (about 8 per cent). Also, the population with the highest contamination contained fewer younger animals. This suggests that toxic chemicals present in the eggs may be causing poor survival of the eggs and fewer young animals are entering the population.

Although there has been a decrease in contamination in the Great Lakes in the last 20 years, there are still localized areas of contamination, which sedentary species in these areas allow researchers to monitor. These types of effects are similar to those found in cormorants, mink and fish exposed to polychlorinated dioxins, furans and polychlorinated biphenyls in the Great Lakes/St. Lawrence River basin and elsewhere.



A. Gendron

Radiograph of mudpuppy limbs showing polydactily (extra toes) and toes that are fused together.

J. Mitchell

American Toad

WHAT *YOU* CAN DO

Volunteers are making an important contribution to the understanding of amphibian populations in Ontario. Environment Canada is maintaining a database of information generated by volunteers. This means long-term information will be available on the geographic distribution and species diversity of frogs and toads in Ontario. The annual analysis of the data will provide an indication of large scale changes in amphibian populations over a broad area and identify when amphibians begin to colonize recently enhanced or rehabilitated wetlands. Monitoring also promotes interest and knowledge about amphibians which will hopefully promote habitat protection, especially on privately owned lands.

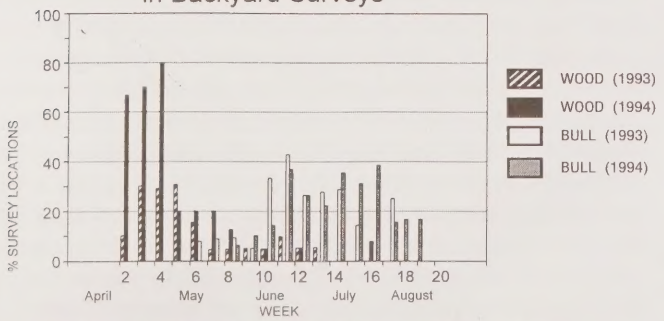
Volunteer monitoring can make a difference. The decline in populations of the Northern leopard frog (*Rana pipiens*) in Alberta occurred suddenly over a one year period. Unfortunately, there was no monitoring program in place to detect this decline until several years later. Today, a sudden population decline would be evident through volunteer monitoring programs, especially as more areas of the country are monitored.

The Canadian Declining Amphibian Populations Task Force was formed in 1991 to promote interest and research on amphibians, to determine the causes of observed population fluctuations, and to foster public education about amphibians and involvement in amphibian monitoring. In association with this Task Force, three volunteer amphibian monitoring projects are being carried out in Ontario: Backyard Surveys, Road Call Counts and Marsh Monitoring Surveys. Anyone can conduct any or all of these surveys.

Backyard Surveys

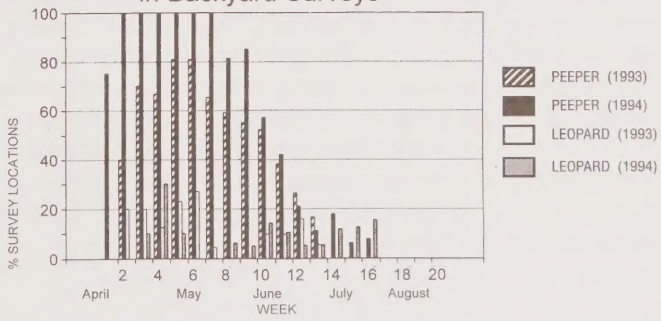
Backyard Survey volunteers listen from a convenient location for three minutes each night from April to August. The volunteers record the species of frogs and toads they hear calling, as well as the relative density of calling, air temperature and time of night. This information reveals the peak period of amphibian calling and breeding.

Seasonal Trends in Frog Calls
in Backyard Surveys



Maximum Number of Observers: 1993-26, 1994-21

Seasonal Trends in Frog Calls
in Backyard Surveys



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Amphibian Road Call Counts

Road Call Counts are especially suitable for volunteers who would like to participate in an amphibian survey, but don't live in a rural area with frogs and toads calling near their home. Survey routes comprising 10 stops located 0.8 km apart, for a total of 7.2 km are selected along quiet two-lane roads where listening will not be affected by traffic, aircraft, factory or machinery noise. Volunteers are asked to listen at each stop for three minutes and to estimate the density of each amphibian species calling. Over many years, this study indicates where amphibians breed and whether they are declining in occurrence. For information about the Backyard Survey or Road Call Count, see the back of this fact sheet.

Marsh Monitoring of the Great Lakes Basin

Environment Canada is particularly interested in monitoring biodiversity in locations where habitat restoration has been started. The monitoring of newly created or rehabilitated wetlands for changes in amphibian and marsh bird diversity will show the success of the restoration effort. The monitoring techniques in wetland projects involve call counts, as well as intensive surveys for amphibian larvae and mature adults.

In co-operation with Long Point Bird Observatory, the Great Lakes 2000 Cleanup Fund and the U. S. Great Lakes Protection Fund, a new marsh monitoring project has been developed. It is aimed at monitoring diversity in the 42 Great Lakes Areas of Concern and other marshes, and involves volunteers monitoring calls of amphibians and marsh birds. If you would like to spend a few evenings experiencing these marshes and collecting important data on marsh birds and/or amphibians, contact the Long Point Bird Observatory for your instruction booklet and tape (see the back page for contact information).

Amphibian and Reptile Survey

The Ontario Herpetofaunal Summary is an ongoing survey of reptiles and amphibians which began in 1984 and is co-ordinated by the Ontario Field Herpetologists (see back page for contact information). Volunteer contributors collect data on the number of reptiles and amphibians of each species seen, as well as location and weather conditions. This large database provides information about species range and preferred habitat. Comparison of recent sightings and historical records provides a general indication of trends in biodiversity. Many of the apparent declines involve salamanders that require deadfall and piles of wood or stones for shelter and hibernation sites. Large snakes have disappeared in many areas due to persecution by humans. Other species, such as frogs and turtles, suffer in areas where wetlands are disturbed.

WETLAND REHABILITATION

Many of the wetlands in the Great Lakes basin have been degraded by human activity, but it is not too late to save them. Efforts to restore wetlands are underway in several areas across Ontario, including Black Ash Creek, Cootes Paradise and Oshawa Second Marsh.

Black Ash Creek Pond Creation

Started in 1992, the Black Ash Creek Project is taking steps to rehabilitate a coldwater stream and reduce sediment loading in Collingwood Harbour of Lake Huron. Control of erosion and improvement of habitat in the creek with stream bank and escarpment slope stabilization, vegetated buffer strip development, removal of beaver dams, and instream habitat rehabilitation are important features of the improvement in this wetland.

In 1994, the staff of the Collingwood Harbour Remedial Action Plan (RAP) and Black Ash Creek Rehabilitation Project, supported by the Great Lakes 2000 Cleanup Fund, began the construction of a series of floodplain pools as part of a plan to rehabilitate habitat for amphibians and reptiles. Three pools were constructed at various elevations relative to the streambed, and with varying depths and shapes to provide habitat for a wide range of amphibian species, life stages and ages. Wetland vegetation was transplanted to accelerate the development of the pools as quality amphibian habitat.

R. Grillmayer

Artificially created amphibian pool at Black Ash Creek.

Cootes Paradise

The Cootes Paradise Marsh is a 250 ha marsh located at the extreme west end of Lake Ontario where it is bordered by the cities of Dundas, Burlington and Hamilton.

Before 1900, Cootes Paradise provided a haven for thousands of ducks and amphibians. An excellent spawning and nursery habitat for a fishery of northern pike and largemouth bass also was provided by abundant emergent vegetation, such as cattail, burreed, and wild rice, as well as floating and submerged plant species. Since the 1930s, the amount of emergent vegetation has declined by as much as 85 per cent. The degradation of the marsh has had an adverse impact on the diversity and population

Hamilton Harbour RAP

Cootes Paradise

sizes of wildlife including invertebrates, fish, amphibians, reptiles, birds and mammals.

Much of the loss of emergent cover in Cootes Paradise Marsh can be directly linked to increased water elevation over recent decades. Marsh elevation is a function of Lake Ontario's water level, which is kept high for navigational purposes.

Another factor affecting emergent vegetation cover in the Cootes Paradise Marsh is decreased light penetration, or turbidity. Light is essential to photosynthesis and plant growth, even for plants that grow under water. Turbidity can be caused by large numbers of algae, which are the result of high nutrient loading from the Dundas sewage treatment plant, and from input of suspended sediments via three creeks and two combined sewer overflows which empty into Cootes Paradise. The feeding and spawning activities of the common carp, which are abundant in Cootes Paradise, also contribute to turbidity problems.

The Hamilton Harbour Fish and Wildlife Habitat Restoration Project is attempting to restore a diverse community of emergent and submergent vegetation by excluding carp from the marsh, and by re-introducing some native species of emergent vegetation through a planting program. This habitat rehabilitation project includes creating a sheltered embayment, erosion protection, and establishing fish spawning areas and colonial bird nesting islands in Cootes Paradise and Hamilton Harbour.

Oshawa Second Marsh

The Second Marsh, located east of Toronto, is the largest coastal Great Lake wetland in the Greater Toronto Area, and is one of the few remaining Lake Ontario shoreline wetlands adjacent to a large urban centre. Prior to the mid-1970s, the marsh supported a healthy community of game fish, reptiles, amphibians, birds, mammals and a variety of vegetation including many rare species of plants and animals. Since then, it has been affected by increased sediment and turbidity, pollution, and disturbed patterns of water flow from urban development and its proximity to Metro Toronto, and to increases in forestry and agricultural land use in adjacent areas. In the mid-1970s, the western outlet of Second Marsh was dyked to raise the water level. As a result, the central area of the Marsh suffered a complete and extensive die-off of emergent vegetation. Also, the barrier beach was breached at the eastern end of the Marsh, thereby relocating the outflow. This changed the pattern of water flow resulting in increased deposition of sediment and further degradation of wildlife habitat.

The Great Lakes 2000 Cleanup Fund is supporting a community project to rehabilitate and protect the Oshawa Second Marsh. The debris of yesterday's folly is becoming the raw material for tomorrow's rehabilitation as logs and root wads from the site are being used to build habitat islands for wildlife. This project includes: the construction of platforms and nesting boxes to increase wildlife populations and biodiversity; improving water circulation by reopening the western outlet and removing the log jam from Farewell Creek; adopting controls for purple loosestrife; exclusion of common carp from most of the marsh; and, the creation of an interpretive centre and an education outreach program for schools, youth groups and the general public.

A. Hagen

Carp exclosure at Oshawa Second Marsh.

Adopt-A-Pond

Most amphibians depend on wetlands for survival during some part of their life. There can be little hope for the future of Canadian reptiles and amphibians unless we can ensure the survival of wetland habitats.

The Metro Toronto Zoo's **Adopt-A-Pond** program is intended to encourage the protection and rehabilitation of existing wetlands. Teachers are encouraged to visit local wetlands with their classes to learn about amphibians first hand.

The principal objectives of the Adopt-A-Pond program are to:

1) connect the loss of wetland habitat with the decline of amphibian populations;
2) empower students to act on behalf of frogs, toads, salamanders and newts; and,
3) think globally and act locally, to introduce to students the real-world problems where they can play an active role.

Teachers can encourage students to use their knowledge about wildlife habitat to identify problems and find solutions in their schoolyard or community. Students can make a difference, like 12 year-old **Gregory Kackmar** of Burlington who saved a local wetland from development by collecting data and presenting it to local planners, which single-handedly changed attitudes in his community.

H. Gosselin

Students performing an amphibian survey.

How You Can Get Involved

For more information on creating frog-friendly communities, teachers and students can write to:

Dr. Bob Johnson
Adopt-A-Pond
Metro Toronto Zoo
P.O. Box 280, West Hill, Ontario
M1E 4R5

For more information on amphibian (frog and toad) monitoring contact:

Canadian Wildlife Service
Environment Canada
Canada Centre for Inland Waters
P.O. Box 5050, 867 Lakeshore Rd.
Burlington, Ontario L7R 4A6
(905) 336-4968

Long Point Bird Observatory
Marsh Monitoring Program
P.O. Box 160, Port Rowan, Ontario N0E 1M0
(519) 586-3531

Ontario Field Herpetologists
R.R.#1
Walsingham, Ontario
N0B 1X0
(519) 586-3985

Further Reading:

Bishop, C. A., and Pettit, K. E. 1992. Declines in Canadian Amphibian Populations: Designing a National Monitoring Strategy. Occasional Paper Number 76. Canadian Wildlife Service, Ottawa.

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Additional Information:

Additional fact sheets in this series include:

- Contaminants in Herring Gull Eggs from the Great Lakes
- Bringing the Bald Eagle Back to Lake Erie
- The Fall and Rise of Osprey Populations in the Great Lakes Basin
- The Rise of the Double-crested Cormorant on the Great Lakes: Winning the War Against Contaminants
- Sustaining Wetlands in the Great Lakes Basin

Information on wetlands and habitat loss in the Great Lakes basin may be obtained from:
Environment Canada
4905 Dufferin St.
Downsview, Ontario
M3H 5T4

For further information on this and other Great Lakes programs, visit Environment Canada's Greenlane on the World Wide Web: http://www.cciw.ca/glimr/intro.html

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